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On the independence of the species *Thominx böhmi* (Supperer, 1953) and its occurrence

O samodzielności gatunku *Thominx böhmi* (Supperer, 1953) i jego występowaniu

The new species *Capillaria böhmi*, described in 1953 by Supperer was found in the frontal sinus of wild foxes (*Vulpes vulpes*) and silver foxes (*Vulpes argentatus*) in Austria. Skrjabin et Shikhobalova (1954) transfer the discussed species to the genus *Thominx* Dujardin, 1845, and jointly with Orlov (1957) express the necessity for an accurate verification of the species in view of its great similarity to *Thominx aerophilus* (Creplin, 1839) Travassos, 1915.

In meantime Kozłowska (1957) records the occurrence of *Thominx böhmi* in the frontal sinus of wild foxes (*Vulpes vulpes*) in Poland (environs of Łódź, and Warsaw ZOO.).

The cited data induced us to closer interest into the problem to enrich our information on the occurrence of *Thominx böhmi* in Poland and on the circle of its natural hosts. It was also aimed to conduct a comparative analysis between *Thominx böhmi* (Supperer, 1953), and *Thominx aerophilus* (Creplin, 1839).

The total number of 31 wild foxes, 4 wolves and additionally 6 dogs originating from the Lublin district was examined. In 30 foxes, 2 wolves and 3 dogs there were found in the nasal cavity, and maxillar and frontal sinus nematodes of the genus *Thominx*, which belonged either to the species *Th. aerophilus* or to *Th. böhmi*.

Table I shows the biometric data (in millimetres) of the two compared species (the authors' measurements concerning to *Th. böhmi* were taken on 62 females and 54 males).

As regards *Th. aerophilus* we present only those dimensions taken by us which reflect something new, therefore the remaining

Table I

Comparison of biometrical data of *Th. aerophilus* and *Th. böhmi*

Measurements	*Thominx aerophilus*					*Thominx böhmi*	
	Freitas et Lent, 1936	Lopez-Neyra, 1947	Petrov, 1941	Baylis, 1937	Present paper	Supperer, 1953	Present paper
Female: Lengt	20—40	20—40	18—20	—	—	30—41.25	22.3—64.0
Max. width	0.10—0.18	0.10—0.18	0.096—0.105	—	0.128—0.145	0.120—0.210	0.131—0.328
Length of oesophagus	7.4	7.4	5.0—5.4	—	—	6—7	5.5—10.1
No. of oesophageal cells	45—50	45—50	—	—	above 42	29—34	29—37
Length of oesophagus to length of body	1:3	1:3,3324—1:4.4	—	—	—	1:5.0—1:5.89	1:3.5—1:6.6
Eggs with opercula	0.062—0.079 × 0.035—0.040	0.062—0.079 × 0.035—0.040	0.062—0.077 × 0.033—0.037	0.079—0.08 × 0.029—0.04	— —	0.063—0.065 × 0.030—0.034	0.064—0.070 × 0.030—0.032
Male: Length	15—25	15—25	15—18	—	—	15—25	12.1—33.9
Max. width	0.1	0.1	0.06—0.07	—	—	0.075—0.113	0.076—0.131

Length of oesophagus	8.3	—	5.86	—	—	—	5.5—9.1
No. of oesophageal cells	—	—	—	—	above 42	—	29—38
Length of oesophagus to length of body	1:2	1:1.8—1:2	—	—	—	1:1.5	1:2.2—1:3.9
Total length of spicule	?	?	?	?	?	1.175	1.0?
Max. length of extruded spi-cule	—	—	—	0.55	—	—	0.546
Width of spicular end	—	—	—	0.005	0.00378	—	0.00252—0.00378
Mean width of spicule	—	—	—	0.003—0.004	0.00252	—	0.00126—0.00252
Length of unextruded sheath	0.9	0.9	0.635	—	0.676—0.83	—	0.71—0.95
Max. length of extruded sheath	—	—	—	—	—	0.5	0.5
Width of calyx-like expan-sion of sheath	—	—	—	—	—	—	0.0286
Mean width of sheath	0.018	0.018	—	—	0.013—0.0182	0.02169—0.02411	0.013—0.0182

data, which corroborate with the data cited in the literature, are in the table not shown.

The comparative analysis of the two discussed species made on the basis of the table I shows as the most conspicuous the following differences:

1. Maximal length of *Th. aerophilus* in the male attains 25 mm, and in the female 40 mm, while the same dimension in *Th. böhmi* attains correspondingly 34 mm and 64 mm.

2. The number of cells of the oesophagus in *Th. aerophilus* fluctuates within the limits 42 — 50, while in *Th. böhmi* shows 29 — 38 oesophageal cells.

In spite of Supperer's suggestion, our data do not entitle to acknowledge the differences in the proportion of the oesophageal part to the length of the body, as well as the differences in the mean dimensions of eggs, as diagnostic characteristics for the differentiation of *Th. aerophilus* and *Th. böhmi*. The remaining biometric data for the two species lie more or less within the same limits.

At the same time the table I shows that, strictly speaking, the sole characteristic (of the biometric nature) which enables undoubtedly the differentiation of the studied species is the number of the oesophageal cells: in *Th. aerophilus* the number always surpasses 40, and in *Th. böhmi* it never attains 40.

The comparison of the configuration of the separate areas of the body and that of the various organs of the two discussed species leads to the following conclusions:

1. In females the anterior end of the body, location and configuration of the genital pore are identical in the two species.

2. In the female of *Th. aerophilus* the location of anus is named in the literature as subterminal, and for the female of *Th. böhmi* as terminal. The analysis of this characteristics on the basis of our material showed that anus in the female of *Th. böhmi* is also marked by a slight subterminal displacement. In view of this we can neither see essential differences as regards this characteristic.

3. In the males both the anterior and the posterior end of the body (2 papillae joined by a delicate membrane) in both species show the same structure.

4. The structure of the spicular sheath (calyx-like expansion on one of the ends with small thorns, longer thorns on the remaining part of the sheath) is identical in the males of the two species.

5. The spicules in the males of *Th. aerophilus* and *Th. böhmi* are also identical. This refers both to the shape, mean thickness, terminal dilation, internal structure and to the degree of getting „chitinous". Similarly as in *Th. aerophilus*, the determination of the total length of the spicule in *Th. böhmi* is very difficult and uncertain. The corresponding dimension given by us for *Th. böhmi* = ≈ 1.0 mm? denotes, that we were able to trace the length of the spicule inside the male of this species only on the distance of 1 millimetre. But the determination of the proximal end of the spicule, i. e. the determination of the total length, was impossible.

6. Both the shape and the dimensions of the eggs are similar in the two species.

7. The ornamentation of the external surface of the egg shell is so characteristically different that it constitutes the surest basis for the differentiation of the discussed species. In *Th. aerophilus* the external egg shell shows a reticular structure (shallow grooves of a reticular course show on the cross small round depressions). On the external surface of the egg shell of *Th. böhmi* there can be observed crater-like elevations of various size and frequently of irregular outline, in the centre of which there appear distinct depression. The described ornamentations of the egg shells should be treated as constant species characteristics.

As regards problems of ecological nature we are of the opinion that it would be also purposeful to discuss the problem of the hosts and the habitat of the two described species. As known the list of hosts for *Th. aerophilus* includes fairly numerous species of domestic and wild carnivorous mammals and even the hedge-hog (*Erinaceus europaeus* L.) and the man, but for *Th. böhmi* hitherto were recorded only foxes (wild and silver).

Supperer (1953) found *Th. böhmi* in 3 out of 5 examined foxes; Kozłowska found it in 40% of wild foxes in the Łódź environs. Our studies pointed to the presence of this parasite in 29 wild foxes in the total number of 31 examined individuals (93.5%), in 2 wolves in 4 examined an din 3 dogs in 6 examined. Thus the list of hosts of *Th. böhmi* was increased by 2 new species.

The problem of the habitat of the two discussed species of nematodes presents a very interesting aspect in the light of our studies. The present corresponding data give as the habitat of *Th. aerophilus* lungs, bronchi, trachea and nasal cavity, and for *Th. böhmi* exclusively the frontal sinuses. Results of the examinations of the nasal

cavity and paranasal sinuses of the hosts dissectioned by us are presented in tables II and III.

The tables II and III show that for *Th. aerophilus* a rare habitat (besides the nasal cavity) can be also the paranasal sinuses (maxillar and frontal). *Th. böhmi,* however, is not limited to the frontal sinuses only, but most commonly lives simultaneously in the nasal cavity and in the paranasal sinuses.

Table II
Thominx aerophilus

Host species	No. of examined	Negative result	Nasal cavity only	Nasal cavity and sinus paranasales
fox	31	25	3	3
wolf	4	—	—	—
dog	6	—	—	—

Table III
Thominx böhmi

Host species	No. of examined	Negative result	Nasal cavity only	Frontal sinus only	Nasal cavity and sinus paranasales
fox	31	2	1	1	27
wolf	4	2	2	—	—
dog	6	3	1	—	2

The prevailing majority of the examined foxes showed the simultaneous presence of the mono-species invasion of *Th. aerophilus* in bronchi and trachea. In 6 cases, in which in the examined foxes *Th. aerophilus* was found in the nasal cavity or in the paranasal sinuses, the parasite was simultaneously found also in the trachea and bronchi. *Th. böhmi,* however, appears to be unable to the existence in the trachea, bronchi and lungs of the host.

In the examined wolves and dogs only *Th. böhmi* were found.

This shows that the sole area, in which *Th. aerophilus* and *Th. böhmi* can co-exist side by side, is the nasal cavity with the paranasal sinuses. In our studies conducted on 30 foxes, in which the nematodes of the genus *Thominx* were found in the cranial section of the respiratory tract, in one fox the invasion with *Th.*

aerophilus was mono-species (nasal cavity with paranasal sinuses), in 24 foxes — the invasion with *Th. böhmi* was also mono-species, and in 5 foxes the invasion was mixed.

The cases of mixed invasion deserve special attention. In 3 out of 5 foxes the mixed invasion was limited solely to the nasal cavity, while the frontal and maxillar sinuses showed only the mono-species invasion with *Th. böhmi*. In these three cases in the nasal cavity there were besides numerous individuals (up to 75) of *Th. böhmi* barely single specimens of *Th. aerophilus*. In the 2 remaining foxes the mixed invasion was found to be both in the nasal cavities and in the paranasal sinuses. This time, however, the prevailing species was *Th. aerophilus*, because in 60 — 80 individuals of this species only single individuals (2) of *Th. böhmi* were seen.

Analysing all the morphological and ecological data the following conclusions are reached:

1. Although *Th. aerophilus* and *Th. böhmi* show a number of similarities, the significantly different number of the oesophageal cells (42 — 50 in *Th. aerophilus* and 29 — 38 in *Th. böhmi*), as well as fundamentally different structures of the surface of the external egg shell, which are constant characteristics, prove the separateness of the two compared species.

2. The main habitat of *Th. aerophilus* is: lungs, bronchi, and trachea, and only in rare cases the nasal cavity and the parasal sinuses (maxillar and frontal) of the host.

3. The habitat of *Th. böhmi* is: nasal cavity and paranasal sinuses. In the trachea and in the pulmonar section of the respiratory tract this species does not occur.

4. *Th. aerophilus* and *Th. böhmi* should be regarded not only as morphologically similar, but also as closely related species.

5. In the prevailing majority of cases the cranial section of the respiratory tract shows the mono-species invasion with *Th. böhmi*. Rarely there is an invasion of the mono-species character with *Th. aerophilus* in the nasal cavity and the paranasal sinuses of the host. In few cases of a mixed invasion of this section of the respiratory tract there is a marked competition between the compared species. At a greater intensity of one of the species (surpassing in extreme cases even 120 specimens) the second species is clearly the receding one (at the most single individuals).

6. At the present moment the fundamental nomenclative and ecological data of *Th. böhmi* are as follows:

Thominx böhmi (Supperer, 1953) Skrjabin et Shikhobalova, 1954

Syn.: *Capillaria böhmi* Supperer, 1953

Hosts: *Vulpes vulpes* (L.), *Vulpes argentatus, Canis (C.) lupus* L., *Canis (C.) familiaris L.*

Habitat: nasal cavity and paranasal sinuses (sinus maxillares and sinus frontales).

Geographical distribution: Austria and Poland.

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LITERATURE

1. Baylis H. A. — A note on *Capillaria aërophila* (*Nematoda*). Parasitology, 29, 3, 1937.
2. Freitas T. J. F., Lent H. — Estudo sobre os *Capillariinae* parasitos de mammiferos. Mem. do Inst. Osw. Cruz, 31, 1, 1936.
3. Kozłowska J. — Z badań nad helmintofauną lisów hodowlanych i dzikich. Act. Parasit. Polon., 5, 10, 1957.
4. Nöller W., Schmidt F. — Zur Diagnose des Lungenwurmbefalles bei Pelztieren. Zeitsch. f. Parasitenk., 4, 4, 1932.
5. Skrjabin K. I. (red.) — Opredelitel parazitičeskich nematod, IV. Izd. Akad. Nauk SSSR, Moskva, 1954.
6. Skrjabin K. I. (red.) — Osnovy nematodologii, VI. Izd. Akad. Nauk SSSR, Moskva, 1957.
7. Supperer R. — *Capillaria böhmi* spec. nov., eine Haarwurmart aus den Stirnhöhlen des Fuchses. Zeitsch. f. Parasitenk., 16, 1, 1953.
8. Travassos L. — Contribuiçoes para o conhecimento da fauna helmintolojica brasileira. Sobre as especies brasileiras do genero *Capillaria* Zeder, 1800. Mem. do Inst. Osw. Cruz, 7, 2, 1915.

STRESZCZENIE

Autorzy przeprowadzając porównanie gatunków *Thominx aerophilus* (C r e p l i n, 1839) i *Th. böhmi* (S u p p e r e r, 1953) dochodzą do następujących wniosków:

1. *Th. böhmi* jest gatunkiem samodzielnym i nie może być synonimizowany z *Th. aerophilus.*

2. W skład żywicieli *Th. böhmi* wchodzą: *Vulpes vulpes* (L.), *Vulpes argentatus, Canis (C.) lupus* L. i *Canis (C.) familiaris* L.

3. Miejscem lokalizacji *Th. böhmi* są: jama nosowa i zatoki przynosowe (szczękowe i czołowe), nigdy zaś tchawica i oskrzela.

4. *Th. aerophilus* obok typowych miejsc lokalizacji, jakimi są: płuca, oskrzela i tchawica, w rzadkich przypadkach występuje także w jamie nosowej i zatokach przynosowych żywiciela.

5. W jamie nosowej i zatokach przynosowych *Th. aerophilus* i *Th. böhmi* są gatunkami konkurującymi. W rzadkich przypadkach inwazji mieszanej zawsze jeden z gatunków jest dominujący, drugi zaś ustępujący.

EXPLANATION OF PLATES

PLATE I

Thominx aerophilus (Creplin, 1839): 1 — Egg — optical section; 2, 3, 4 — Structure of the external surface of the egg shell in various levels. About 960 × (Zeiss apochrom., oil imm., 60 ×, ocular 7 ×).

PLATE II

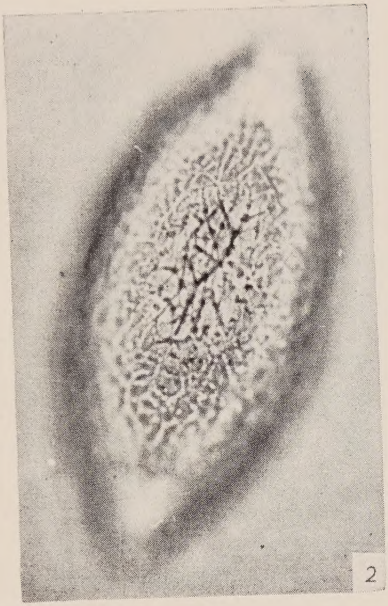
Thominx böhmi (Supperer, 1953): 5 — Egg — optical section; 6, 7, 8 — Structure of the external surface of the egg shell in various levels. About 960 × (Zeiss apochrom., oil imm., 60 ×, ocular 7 ×).

PLATE III

Thominx aerophilus (Creplin, 1839): 9 — Posterior end of male (about 300 ×); 10 — Posterior end of male with spicular sheath and spicule (about 57 ×); 11 — Spicular sheath and spicule (about 114 ×); 12 — Posterior end of female (about 114 ×).

PLATE IV

Thominx böhmi (Supperer, 1953): 13 — Posterior end of male (about 300 ×); 14 — Posterior end of male with spicular sheath and spicule (about 57 ×); 15 — Spicular sheath and spicule (about 177 ×); 16 — Posterior end of female (about 114 ×).



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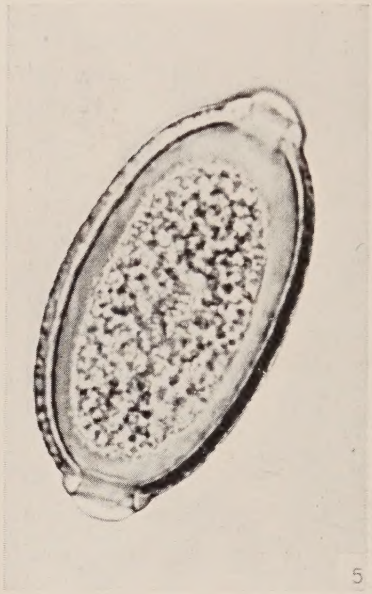
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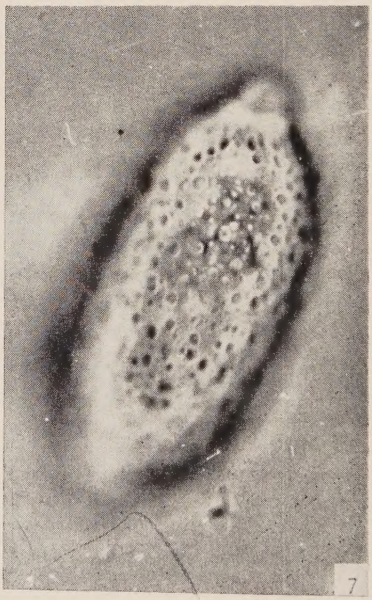
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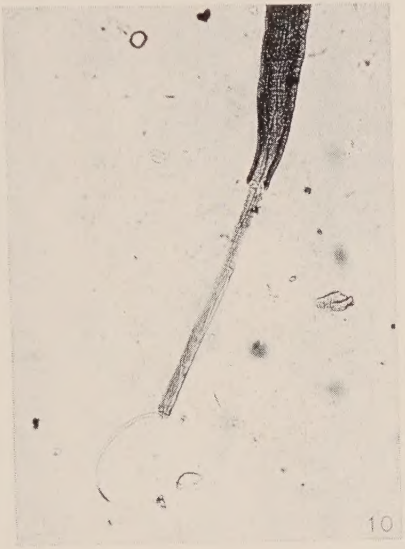

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